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DEPARTMENT OF ARCHIVES

GOVERNMENT OF MAHARASHTRA, MUMBAI.

NAME OF RECORD : REVENUE DEPARTMENT

NO : 24-462.

YEAR : 1880

EXPOSED BY : ANIL SAWANT

DATE : 06/10/2007

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Govt. Dept.

No. 462

Agricultural Improvements

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1888.

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Agricultural Improvement

Report on the Supt. of the Experimental Farm at Bangalore on the cultivation of Queensland maize with cattle manure.

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1890.

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No. 162.

Agricultural Improvement

Report on the results of the Experimental Farm at Bangalore on the cultivation of Queensland maize with cattle manure.

Former Papers in Corsp. No. 26

Subsequent " No. 28

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1881.

Sept. 30th.

No. 462.

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Report by the Supt. of the Experimental Farm at Bangalore on the cultivation of Queensland maize with Cattle manure.

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Report by the Supt of the Experimental Farm at Bangalore on the cultivation of Queensland maize with Cattle manure.

Former Papers in Comp. No.		18
Subsequent	" No.	18

No. [illegible]

Extract from the Proceedings of the Government of India in the Home, Revenue and Agricultural Department (Agriculture and Horticulture), under date Fort William, the [illegible] December 1881.

READ—

A report by the Superintendent of the Experimental Farm at Saharanpur for the half year ending the 31st December 1879, on the results of experiments made with cattle manures in the Province of Oudh and Land manure.

Read also—

An article in the Pioneer dated the 1st September 1879, on the subject of manures and their classification.

OBSERVATIONS.

The Governor General in Council is of opinion that experiments, similar to those made on the Saharanpur Farm, might usefully be undertaken in other parts of India by officers in charge of public gardens, jail gardens or Government or Municipal farms. A careful record of such experiments should be kept, and an account of them, including a table of statistics in the accompanying form, should form a part of the annual reports furnished by each office. Copies of these reports should be forwarded by Local Governments and Administrations to this Department.

2. The most useful experiments would be those which have for their object the improvement of processes already adopted by cultivators, or the utilization as manurial measures of the common products of the country. They should be conducted on a uniform system, and should consist (1) in cultivating equal areas of manured and unmanured soil of the same kind, under the same conditions, with the same crop; (2) in cultivating different crops in equal areas of manured and unmanured soil of the same kind, under the same conditions. (3) in varying the soil, other things being equal, (a) in varying the kind or amount of the manure, other things being equal; (b) in varying the conditions as of the presence or absence of irrigation.

ORDER.—Ordered that a copy of this Resolution and of the papers read in the preamble be forwarded to Local Governments and Administrations for information and guidance.

[illegible]

[illegible]

Extract from the Proceedings of the Government of [illegible] Fort William in Bengal, [illegible] Fort William, the [illegible] day of [illegible] 1[illegible].

[illegible]

Read—

A report by the Agricultural Chemist to the Government of [illegible] for the half year ending October [illegible], on the results of certain experiments made with manures on the farm at Sibpore, Howrah District.

Resolved—

An order to the Chief Secretary to the Government of [illegible], on the subject of manures and their adulteration.

OBSERVATIONS.

The Governor General in Council is of opinion that experiments similar to those made on the Sibpore Farm, might usefully be undertaken in other parts of India by officers in charge of public gardens, jail gardens or Government or Municipal farms. A full record of such experiments should be kept, and a report on them, including a table of results in the accompanying form, should form a part of the annual reports furnished by such officers. Copies of these reports should be forwarded by Local Governments and Administrations to this Department.

2. The most useful experiments would be those which have for their object the improvement of processes already adopted by cultivators, or the utilization as manures of the common products of the country. They should be conducted on a uniform system, and should consist (1) in cultivating equal areas of manured and unmanured soil of the same kind, under the same conditions, with the same crop; (2) in cultivating different crops on equal areas of manured and unmanured soil of the same kind, under the same conditions; (3) in varying the soil, other things being equal; (4) in varying the kind or amount of the manure, other things being equal; (5) in varying the conditions as to the presence or absence of irrigation.

Order.—Ordered that a copy of the foregoing minute and of the papers [illegible] be forwarded to the Secretary to the Government of India in the Home Department, for the information of the Hon'ble the Vice-President in Council.

[illegible]

[illegible]

No. [illegible]

Extract from the Proceedings of the Government of India in the Home, Revenue and Agricultural Department (Agriculture and Statistics),—under date Fort William, the [illegible] 1883.

READ—

A report by the Superintendent of the Experimental Farm at Mangalore for the half year ending the 31st December 1882, regarding certain experiments made with cattle manures in the extension of Queensland grass.

Read also—

An article in the *Indian Agriculturist* of the 1st September 1882, on the subject of manures and their classification.

OBSERVATIONS.

The Governor General in Council is of opinion that experiments similar to those made on the Mangalore Farm, might usefully be undertaken in other parts of India by officers in charge of public gardens, jail gardens or Government or Municipal farms. A careful record of such experiments should be kept, and an account of them, including a table of statistics in the form appearing form, should form a part of the annual reports furnished by such officers. Copies of these reports should be forwarded by Local Governments and Administrations to this Department.

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Order.—Ordered that a copy of this Resolution, and of the papers read in the preamble, be forwarded to Local Governments and Administrations for [illegible] and guidance.

(For Extract)

[illegible]

* [illegible]

No. 62/74

Extract from the Proceedings of the Government of India in the Home, Revenue and Agricultural Department (Agriculture and Horticulture)—under date Fort William, the 12 January 1880.

READ—

A report by the Superintendent of the Experimental Farm at Bangalore, for the half year ending the 31st December 1878, regarding certain experiments made with cattle manure in the cultivation of Queensland maize.

Read also—

An article in the *Indian Agriculturist* of the 1st September 1879, on the subject of manures and their classification.

OBSERVATIONS.

THE Governor General in Council is of opinion that experiments, similar to those made on the Bangalore Farm, might usefully be undertaken in other parts of India by officers in charge of public gardens, jail gardens or Government or Municipal farms. A careful record of such experiments should be kept, and an account of them, including a table of statistics in the accompanying form, should form a part of the annual reports furnished by such officers. Copies of these reports should be forwarded by Local Governments and Administrations to this Department.

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ORDER.—Ordered that a copy of this Resolution, and of the papers read in the preamble, be forwarded to Local Governments and Administrations* for information and guidance.

* Madras, Bombay, Bengal, North Western Provinces and Oudh, Punjab, Central Provinces, British Burma, Assam, Mysore and Coorg, Resident at Hyderabad.

(True Extract.)

C. Bayley

Offg Secretary to the Govt. of India

The Secretary to the Govt. of Bombay

2

No. 62/76

Extract from the Proceedings of the Government of India in the Home, Revenue and Agricultural Department (Agriculture and Horticulture), under date Fort William, the 12 ~~January~~ Feby 1880.

READ—

A report by the Superintendent of the Experimental Farm at Bangalore for the half year ending the 31st December 1878, regarding certain experiments made with cattle manure in the cultivation of Queensland maize.

Read also—

An article in the *Indian Agriculturist* of the 1st September 1879, on the subject of manures and their classification.

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OBSERVATIONS.

THE Governor General in Council is of opinion that experiments, similar to those made on the Bangalore Farm, might usefully be undertaken in other parts of India by officers in charge of public gardens, jail gardens or Government or Municipal farms. A careful record of such experiments should be kept, and an account of them, including a table of statistics in the accompanying form, should form a part of the annual reports furnished by such officers. Copies of these reports should be forwarded by Local Governments and Administrations to this Department.

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ORDER.—Ordered that a copy of this Resolution, and of the papers read in the preamble, be forwarded to Local Governments and Administrations* for information and guidance.

* Madras, Bombay, Bengal, North Western Provinces and Oudh, Punjab, Central Provinces, British Burma, Assam, Mysore and Coorg, Resident at Hyderabad.

(True Extract.)

C. Bayley

Offg Secretary to the Govt of India.

To the Secretary to the Govt of Bombay

Report on an experiment of the value of cattle manure during half year ending 31st December 1878.

The following experiment has been made for the purpose of bringing forward the difference in value of manure under the system of cattle-box manufacture adopted on this farm and of the two common methods of treatment by the ryots in this Province

The cattle-box system of housing cattle is briefly as follows: Over a pit sunk about two and a half feet in the ground, a shed is erected with eaves overhanging in such a manner that neither the sun's rays can penetrate (except at an oblique angle in the morning and evening) to dry up the manure nor the rain fall on or run into the pit to unduly wet the contents and render it too moist for the cattle to rest on. The cattle are housed in this shed at night, each in separate compartment, and were supplied, in the case of the present experiment, with grass only. In the morning a little litter, stalks of plants, leaves or unconsumed food, is strewn over the box, especially where the dung has been dropped, and nothing is removed until the pit is full, when the bulk of the manure is carted away to the field. The top layers not decomposed are replaced in the bottom of the empty pit as litter. In this way twenty loads of manure per annum, containing the whole of the dung and urine dropped while the animal is not at work, are secured; and bulk is obtained by utilizing any waste substance for litter, thus adding a large amount of organic matter, which, placed in the soil, acts as a powerful retainer of moisture.

The cow-dung employed in plot No. II. was obtained from a grazing-ground and placed in a heap for some months until required—the common Native method of storing manure not required for fuel. The ashes were the result of burning an equal weight of the same cow-dung representing the residuum from the "belly", or cow-dung cake, used for fuel throughout India

The experiment was to test the comparative value of equal weights of each manure. Had the experiment taken the form of using the total amount of manure obtained from a bullock in the same time, the result would have been more striking.

It may be remarked that dung was from mature cattle, fed only on grass, without any gram, oil-cake, or other food to enrich the manure

The crop on which the experiment was tried was Queensland maize, grown on a poor light sandy loam. The seed was sown in rows two feet apart on the 18th April, and harvested for the sale of the green cobs 15th of August.

The rain-fall during the period of growth was 3·85 inches, but this was supplemented with occasional irrigation from a well as required.

The following are the results per acre:

Number of plot	Manure per acre	[illegible]	Percentage of increase over the unmanured plot	[illegible]	Percentage of increase over unmanured plot
		[illegible]		[illegible]	
[illegible] No. I	[illegible]	[illegible]	+[illegible]	[illegible]	+71
No. II	Dry [illegible]	[illegible]	+[illegible]	[illegible]	+[illegible]
No. III	[illegible]	[illegible]	+[illegible]	[illegible]	[illegible]
No. IV	Plank	[illegible]		[illegible]	

Report on an experiment of the value of cattle manure during half year ending 31st December 1878.

THE following experiment has been made for the purpose of bringing forward the difference in value of manure under the system of cattle box manufacture adopted on this farm and of the two common methods of treatment by the ryots in this Province.

The cattle-box system of housing cattle is briefly as follows: Over a pit sunk about two and a half feet in the ground, a shed is erected with eaves overhanging in such a manner that neither the sun's rays can penetrate (except at an oblique angle in the morning and evening) to dry up the manure nor the rain fall on or run into the pit to unduly wet the contents and render it too moist for the cattle to rest on. The cattle are housed in this shed at night, each in separate compartment, and were supplied, in the case of the present experiment, with grass only. In the morning a little litter, stalks of plants, leaves or unconsumed food, is strewn over the box, especially where the dung has been dropped, and nothing is removed until the pit is full, when the bulk of the manure is carted away to the field. The top layers not decomposed are replaced in the bottom of the empty pit as litter. In this way twenty loads of manure per annum, containing the whole of the dung and urine dropped while the animal is not at work, are secured; and bulk is obtained by utilizing any waste substance for litter, thus adding a large amount of organic matter, which, placed in the soil, acts as a powerful retainer of moisture.

The cow-dung employed in plot No 11. was obtained from a grazing-ground and placed in a heap for some months until required—the common Native method of storing manure not required for fuel. The ashes were the result of burning an equal weight of the same cow-dung representing the residuum from the "bretly", or cow-dung cake, used for fuel throughout India

The experiment was to test the comparative value of equal weights of each manure. Had the experiment taken the form of using the total amount of manure obtained from a bullock in the same time, the result would have been more striking

It may be remarked that dung was from mature cattle, fed only on grass, without any grain, oil-cake or other food to enrich the manure

The crop on which the experiment was tried was Queensland maize, grown on a poor light sandy loam The seed was sown in rows two feet apart on the 15th April and harvested for the sake of the green cobs 15th of August

The rain fall during the period of growth was 3.85 inches, but this was supplemented with occasional irrigation from a well as required

The following are the results per acre

Report on an experiment of the value of cattle manure during half year ending 31st December 1878.

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The cattle-box system of housing cattle is briefly as follows: Over a pit sunk about two and a half feet in the ground, a shed is erected with eaves overhanging in such a manner that neither the sun's rays can penetrate (except at an oblique angle in the morning and evening) to dry up the manure nor the rain fall on or run into the pit to unduly wet the contents and render it too moist for the cattle to rest on. The cattle are housed in this shed at night, each in separate compartment, and were supplied, in the case of the present experiment, with grass only. In the morning a little litter, stalks of plants, leaves or unconsumed food, is strewn over the box, especially where the dung has been dropped, and nothing is removed until the pit is full, when the bulk of the manure is carted away to the field. The top layers not decomposed are replaced in the bottom of the empty pit as litter. In this way twenty loads of manure per annum, containing the whole of the dung and urine dropped while the animal is not at work, are secured; and bulk is obtained by utilizing any waste substance for litter, thus adding a large amount of organic matter, which, placed in the soil, acts as a powerful retainer of moisture.

The cow-dung employed in plot No. II. was obtained from a grazing-ground and placed in a heap for some months until required—the common Native method of storing manure not required for fuel. The ashes were the result of burning an equal weight of the same cow-dung representing the residuum from the "brelly", or cow-dung cake, used for fuel throughout India

The experiment was to test the comparative value of equal weights of each manure. Had the experiment taken the form of using the total amount of manure obtained from a bullock in the same time, the result would have been more striking.

It may be remarked that dung was from mature cattle, fed only on grass, without any gram, oil-cake, or other food to enrich the manure

The crop on which the experiment was tried was Queensland maize, grown on a poor light sandy loam. The seed was sown in rows two feet apart on the 18th April, and harvested for the sale of the green cobs 18th of August

The rain-fall during the period of growth was 3 85 inches, but this was supplemented with occasional irrigation from a well as required

The following are the results per acre

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

The small quantity of manure employed, the minimum of water used, and the comparatively poor soil to which they were applied, fully account for the light yield, but the comparative result is very clear.

The yield of the cattle-box manure, both in cobs and fodder of 74 per cent. and 71 per cent., respectively, over the unmanured plot, is remarkably high, the manure being well rotted and taken from the lowest part of the pit where it was thoroughly saturated with urine.

The slight increase of four per cent. given by the ashes over cattle-dung manure is due to the forcing action of the former, the whole of the constituents being released from the organic combinations they were held as inassimilable vegetable matter. But as the dung of an animal has been proved by careful experiments in Europe to contain only about one-fourth of the plant food voided in both dung and urine, it is not surprising to find the result of its action far less energetic than when both are combined, as in the case of the cattle-box manure. The actual decrease of fodder, when ashes were employed, is curious. The plant probably suffered under the too stimulating action of ashes from insufficient moisture, though the amount given, when aided by the organic matter combined both in the dryed cow-dung and the cattle-box manure, was adequate. The frequent waterings asserted as necessary for maize by Native gardeners round Bangalore are probably largely due to their partiality for ashes as a manure, for on this farm where cattle-box manure is chiefly employed, and where a deeper cultivation is given, crops are raised with a considerably smaller amount.

F. E. HARMAN, M. R. A. C., F. C. S.,
Superintendent, Experimental Farm, Bangalore.

N. C. D.—Home, Edu. & Agri. Dept. Press—No. 623—2 2-06—233.

MANURES AND THEIR CLASSIFICATION.

THERE are three methods adopted to maintain and improve the fertility of soils:

1st.—Fallowing.
2nd.—Rotation of crops.
3rd.—Manuring.

The soil contains an inexhaustible supply of mineral food, not of course all available at once, but only so much of it as the natural processes of disintegration, mechanical and chemical, are constantly liberating. It may, we think, be as safely accepted that the air, water, and the soil contain an equally inexhaustible store of organic food.

It has been held that ammonia (nitrogen) exists in nature in such quantities that, with farmyard manure, it is quite unnecessary to supply it (nitrogen) in artificial manures.

The following experiment, conducted by Mr. Lawes, extending over eighteen years, we think may be held as conclusive in the matter:

Two plots of land, side by side, for eighteen years were manured alternately with ammonia salts and phosphate of lime. In 1852 plot No. 1 was treated with ammonia, plot No. 2 received superphosphate. In 1853 No. 1 got superphosphate, and No 2 ammonia; and so on for eighteen years. Thus, each plot had been nine times manured with ammonia and nine times with mineral phosphates. Over the whole time the average produce of both was exactly the same, 24⅝ bushels; but the average of the eighteen crops grown by mineral manure alone, whether on plots No. 1 or No. 2, was only 17⅝ bushels: whilst the average of the 18 crops grown on either plot by ammonia salts was 31⅝ bushels, being an increase of nearly 14 bushels per acre more each year. These results, confirmed by Voelcker, and tested by the practice of agriculturists, in a general way, may be safely accepted as conclusive.

Whatever may have been the practice in times gone by, when land was cheap, and held on favourable terms, with comparatively little machinery in use for agricultural purposes, and when competition had not assumed the proportions that render it imperatively necessary for the agriculturist to avail himself of every legitimate means of increasing the weight and quality of crops,—when agriculture had no existence as science, except in the brain and practice of a few men much in advance of their time, like Blaimire, of Cumberland, who sowed those ideas which the clear-headed tenant-farmers of Cumberland and the North have certainly not let die, and who side by side with Joseph Hume, in the days long before liberalism became fashionable, protested, session after session, against extravagance, corruption, and incompetency,—certainly now-a-days, when the struggle for existence and the survival of the fittest are facts brought home to most men's consciousness, every possible means that may fairly be used to meet the exigencies of the present ought to be carefully studied and brought into practice.

Manures may be classified in several ways, according to the view-point of the classifier. They may be classified in the three following ways, with sufficient exactitude to answer most purposes. *1st* as to their origin; *2nd*, as to their composition, *3rd*, as to their uses.

The small quantity of manure employed, the minimum of water used, and the comparatively poor soil to which they were applied, fully account for the light yield, but the comparative result is very clear.

The yield of the cattle-box manure, both in cobs and fodder of 74 per cent. and 71 per cent., respectively, over the unmanured plot, is remarkably high, the manure being well rotted and taken from the lowest part of the pit where it was thoroughly saturated with urine.

The slight increase of four per cent. given by the ashes over cattle-dung manure is due to the forcing action of the former, the whole of the constituents being released from the organic combinations they were held as inassimilable vegetable matter. But as the dung of an animal has been proved by careful experiments in Europe to contain only about one-fourth of the plant food voided in both dung and urine, it is not surprising to find the result of its action far less energetic than when both are combined, as in the case of the cattle-box manure. The actual decrease of fodder, when ashes were employed, is curious. The plant probably suffered under the too stimulating action of ashes from insufficient moisture, though the amount given, when aided by the organic matter combined both in the dryed cow-dung and the cattle-box manure, was adequate. The frequent waterings asserted as necessary for maize by Native gardeners round Bangalore are probably largely due to their partiality for ashes as a manure, for on this farm where cattle-box manure is chiefly employed, and where a deeper cultivation is given, crops are raised with a considerably smaller amount.

F. E. HARMAN, M. R. A. C., F. C. S.,
Superintendent, Experimental Farm, Bangalore.

N. C. D.—Home Rev. & Agri. Dept. Press—No. 623—3-2-06—22

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T. E. HARMAN, [illegible],
Superintendent, Experimental Farm, Bangalore.

[illegible] Dom-Home, Rev & Agri Dept Press—[illegible]

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2nd.—Rotation of crops.

3rd.—Manuring.

The soil contains an inexhaustible supply of mineral food, not of course all available at once, but only so much of it as the natural processes of disintegration, mechanical and chemical, are constantly liberating. It may, we think, be as safely accepted that the air, water, and the soil contain an equally inexhaustible store of organic food.

It has been held that ammonia (nitrogen) exists in nature in such quantities that, with farmyard manure, it is quite unnecessary to supply it (nitrogen) in artificial manures.

The following experiment, conducted by Mr. Lawes, extending over eighteen years, we think may be held as conclusive in the matter:

Two plots of land, side by side, for eighteen years were manured alternately with ammonia salts and phosphate of lime. In 1852 plot No. 1 was treated with ammonia, plot No. 2 received superphosphate. In 1853 No. 1 got superphosphate, and No. 2 ammonia; and so on for eighteen years. Thus, each plot had been nine times manured with ammonia and nine times with mineral phosphates. Over the whole time the average produce of both was exactly the same, $24\frac{5}{8}$ bushels; but the average of the eighteen crops grown by mineral manure alone, whether on plots No. 1 or No. 2, was only $17\frac{3}{4}$ bushels; whilst the average of the 18 crops grown on either plot by ammonia salts was $31\frac{4}{8}$ bushels, being an increase of nearly 14 bushels per acre more each year. These results, confirmed by Voelcker, and tested by the practice of agriculturists, in a general way, may be safely accepted as conclusive.

Whatever may have been the practice in times gone by, when land was cheap, and held on favourable terms, with comparatively little machinery in use for agricultural purposes, and when competition had not assumed the proportions that render it imperatively necessary for the agriculturist to avail himself of every legitimate means of increasing the weight and quality of crops,—when agriculture had no existence as science, except in the brain and practice of a few men much in advance of their time, like Blaimire, of Cumberland, who sowed those ideas which the clear-headed tenant-farmers of Cumberland and the North have certainly not let die, and who side by side with Joseph Hume, in the days long before liberalism became fashionable, protested, session after session, against extravagance, corruption, and incompetency,—certainly now-a-days, when the struggle for existence and the survival of the fittest are facts brought home to most men's consciousness, every possible means that may fairly be used to meet the exigencies of the present ought to be carefully studied and brought into practice.

Manures may be classified in several ways, according to the view-point of the classifier. They may be classified in the three following ways, with sufficient exactitude to answer most purposes *1st* as to their origin, *2nd*, as to their composition *3rd*, as to their uses

First, as to their *origin*; they may be regarded as either 1st, natural; or 2nd, artificial. This division makes a clear distinction between all substances used as manures which are produced without man's intervention, and those which are the product of the ingenuity of man. Under the former, natural manures, such widely different substances as farm manures, guano, nitrate of soda, lime, and natural products such as these, are classed together, although in another view, guano, nitrates, lime, &c., though natural products, are nevertheless artificial manures. More correctly speaking, however, the term artificial might be used to indicate those substances manipulated by the art of man to serve his purposes; and they would embrace every manufactured substance introduced as a fertilizer, such as dissolved bones, and mineral and bone superphosphates of all kinds, as well as those compounds prepared by manufacturers to meet the wants of particular crops—tea, indigo, coffee, grass, potato, turnips, &c., and sold under various names. Manures might also be classified either as to their origin or composition, as—1st, animal; 2nd, vegetable; or 3rd, mineral: a classification of this kind, however, is of so vague and general a character as to render it of little practical use.

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contained in the food. If swine are fed on potatoes, their dung contains the mineral constituents of potatoes. The dung of horses contains the mineral matter of the hay, oats, &c., on which they are fed; and it is the same with cattle. The manurial value of their dung will vary with their food, and with the stage at which they have arrived in their progress to maturity, the dung of lean and young animals being least valuable, because they retain in their systems the substances necessary to build them up. When the building process is completed, all that is wanted in food is to repair the waste tissues of their bodies. Farm manure is valuable, not only for its mineral constituents, but also for the large quantities of organic matter, nitrogen chiefly, thrown off by animals in the action of their vital functions. It has been calculated that 20 tons of farm manure contain 2½ cwt. of nitrogen, and if a four-years' rotation is assumed, this quantity is probably amply sufficient to supply the whole course. In addition to this, it should not be forgotten that there are vast quantities of ammonia, N. H. 3 and nitric acid absorbed by the soil and carried down into it by rain and dews; with the application of farm manure, then, there may fairly be supposed to be a gradual increase of valuable plant-food to the soil, and all other things being equal, a continual improvement of its productive powers.

2nd.—Special manures are those which contain chiefly one plant-food, though others may be present. They are only fitted to supply plant-food of a special kind, such as potash, nitrogen or phosphorous. It must not, however, be supposed that they do nothing more; in every special manure there are always other ingredients, which, while they add nothing, or very little, to their market value, are of great use to the soil in helping to bring about its disintegration; and which play important parts in the decomposition and formation of compounds in the soil. It should, however, be borne in mind that they are valuable chiefly, if not solely, from a commercial point of view, for their potash, nitrogen or phosphorous, and that they should be supplied to soils where there is good reason to believe that these substances are deficient, or where their application would bring into usefulness other plant-foods in which the land abounds.

Farm manure may be used year after year in a perfectly mechanical fashion, and as a matter of course; but special manures demand thought and skill in watching results and arriving at conclusions. The agriculturist who observes and experiments with intelligence on the effects of special manures, is in a fair way of making the most out of his land in the shortest time, and with the greatest profit. It is in the use of special manures, however, nitrates, kainites and phosphates, especially the two former, that most unfortunate mistakes have been made by well-meaning men attempting to follow the practice, the successful practice, of some one who has made them his study, and so acquainted himself with all the conditions of success in their application. These conditions are so many and varied, and have reference to the character of soils, subsoils and indigenous vegetation, which sometimes vary over comparatively small areas, that the indiscriminate application of special manures has frequently been followed by disappointment and loss, sufficiently heavy to raise up a feeling of antagonism to what is called high farming and scientific farmers,—a feeling which the conservative tendencies alone of such a profession as that of agriculture were sufficient to rouse, without any additional element of distrust being brought into play, in the failure of imperfectly performed practical experiments. No physician, either in England or elsewhere, over the age of forty, ever believed in Harvey and his theory of the circulation of the blood. Younger men accepted the great discovery, and their elders lived and died in the old faith.

Much the same thing happens with most great truths: they have to fight their way upward to practical recognition. In this respect special and artificial manures are no exception.

The following are the chief special manures in the market. It should be borne in mind that special is here used in opposition to general, and that the designation artificial is much more commonly applied to them:

ARTIFICIAL OR SPECIAL MANURES.

Ammoniacal or Nitrogenous Manures.

Peruvian guano.	Manure cakes (rape).
Ohlendorf guano.	Wool manure (shoddy).
Ammonia-fixed guano.	Grease cakes (refuse).
Ichaboe guano.	Dried blood.
Nitrate of soda.	Refuse of the bodies of fish and other animals.
Sulphate of ammonia.	

POTASH MANURES.

Kainite or crude potash.	Muriate of potash.
Calcined kainite.	Sulphate of potash.

PHOSPHATIC MANURES.

Dissolved bones.	Mineral superphosphate.
Ground bones.	Bone superphosphate.
Ash of bones.	A mixture of bone and mineral superphosphate.
Apatite.	Phosphatic guano.

There remains to be shortly noticed the classification of manures as to their uses. With regard to the effect produced on the soil and crop, manures may be classified as—1st, stimulating; 2nd, nutritive; and 3rd corrective. All ammoniacal manures may be classed as stimulating (see table above); and in its general action on the soil, lime may also fall under this head. Nutritive manures are those whose special function it is to supply a variety of plant-food, so that farm manures, general manures, would be classed under this head. There is, of course, no manure which does not supply plant-food of some kind, in more or less abundance; but the term nutritive could not be applied with correctness to the artificial or special manures enumerated above, whose special functions are by supplying one kind of plant-food to enable the crop to take up large quantities of others stored in the soil. Stimulating manures, instead of retarding or preventing the exhaustion of the soil, quicken it, by enabling the crop to take up greater quantities of plant-food in a shorter period than without their use could be effected.

3rd.—Corrective manures are those whose application to land acts beneficially on some injurious substance, such as an acid, present in undue quantities in the humus, and it may be by liberating the double silicates already referred to in a former article, thus provide abundant food for a higher and more nutritious class of indigenous plants, which ultimately drive out less desirable ones. The judicious and combined application of salt and lime to properly-drained marsh and low-lying pasture lands is something marvellous, and requires to be seen before it can be realised in its entirety.

The uses of lime and salt as corrective manures are of the very highest value; and the application of artificial manures of the costliest kind would probably be utterly useless, a waste of money and labour, until a change had been effected on the indigenous vegetation of the land. In salt the agriculturist possesses a substance by means of which he can regulate, to a great extent, the growth of the stem in all cereals.

Manures manufactured and sold to suit the requirements of special crops are probably increasing in demand. There are, however,

so many conditions necessary to success in producing an article of this kind, that there need be no wonder if they sometimes do not come up to the expectations of the purchaser.

Agriculturists themselves are probably the best parties to observe and experiment on the value of manures prepared to meet the requirements of special crops. It is only just to manufacturers to say that excellence in the preparation of special manures has been arrived at by very careful researches, and by the mingling together of fertilizing matter in those proportions and combinations which experience has proved likely to produce beneficial effects. It is not the interest of the manufacturer to supply worthless stuff. It is his interest to prepare the purest, cheapest, and best special manure that a careful watching of the markets, and a wide experience of the requirements of a special crop, can command. The conditions of success are, however, as we have said, so numerous and varied, that we may hopefully look for a greater development of this class of manure based on a wider and longer experience.

SPECIAL MANURES.

(1)—*For wheat, barley or rye*—
2½ cwt. mineral superphosphate.
2 " sulphate of ammonia.

(2)—*Potato manure*—
4 cwt. mineral superphosphate.
2 " potash salts.
2 " sulphate of ammonia or nitrate of soda.

(3)—*For grass lands deficient in potash*—
2 cwt. mineral superphosphate.
1 " sulphate of ammonia.
2 " calcined kainite.

(4)—*Manure for tea, coffee and indigo*—
30 per cent. of soluble alkalies, chloride of potassium and sodium, and sulphate of potash.
20 " " lime and magnesia.
7 " " Phosphoric acid, equal to 15 per cent. of phosphate of lime.
The remainder being sulphuric acid, iron carbon dioxide, organic nitrogenous matter and silica.

The composition of these special manures is varied according as the requirements of the crop and the nature of the soil are believed to stand in need of particular substances. The quantities given in (1), (2) and (3) are laid on for each acre; No. (4) is applied at the rate of ten cwt. per acre.

In the classification in common use, the term artificial is confined to that class of manures which have come into use during the last forty years. Some of these are in reality natural products, such as guano, nitrate of soda, and kainite, and are misnamed when called artificial; the phosphates of lime and the ammonia sulphates are manufactured products, and are correctly named when called artificial. Limes, chalks and marls, which have been in use for ages, are correctly called natural. Farm manures are classed alone. Green manures have been in use in various parts of Europe from very early times. A crop is grown on the soil which is not taken off, but ploughed in. In Northern Germany farmers plough in spurrey or lupin to obtain a good crop of rye from a light sandy soil. In America clover and Indian corn are used for this purpose. The plants best suited for green manuring are those which in a given time will produce the greatest amount of valuable available plant-food with least labour and cost. In England spurrey mustard and turnips are used. Green manuring adds no new mineral matter to the soil, it simply brings to the surface from greater or less depth material already existing, and spreads it out to meet the requirements of the succeeding crop. In addition to this, the crop used as a green manure extracts from the air valuable organic substances which are given up to the soil when the decomposition of the ploughed-in crop sets in. In green manuring there is an accumulating of mineral food, and a clear gain in organic matters.

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Ichaboe guano.	Dried blood.
Nitrate of soda.	Refuse of the bodies of fish and other animals.
Sulphate of ammonia.	

POTASH MANURES.

Kainite or crude potash.	Muriate of potash.
Calcined kainite.	Sulphate of potash.

PHOSPHATIC MANURES.

Dissolved bones.	Mineral superphosphate.
Ground bones.	Bone superphosphate.
Ash of bones.	A mixture of bone and mineral superphosphate.
Apatite.	Phosphatic guano.

There remains to be shortly noticed the classification of manures as to their uses. With regard to the effect produced on the soil and crop, manures may be classified as—1st, stimulating; 2nd, nutritive; and 3rd corrective. All ammoniacal manures may be classed as stimulating (see table above); and in its general action on the soil, lime may also fall under this head. Nutritive manures are those whose special function it is to supply a variety of plant-food, so that farm manures, general manures, would be classed under this head. There is, of course, no manure which does not supply plant-food of some kind, in more or less abundance; but the term nutritive could not be applied with correctness to the artificial or special manures enumerated above, whose special functions are by supplying one kind of plant-food to enable the crop to take up large quantities of others stored in the soil. Stimulating manures, instead of retarding or preventing the exhaustion of the soil, quicken it, by enabling the crop to take up greater quantities of plant-food in a shorter period than without their use could be effected.

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SPECIAL MANURES.

(1)—*For wheat, barley or rye*—

2½ cwt. mineral superphosphate.
2 „ sulphate of ammonia.

(2)—*Potato manure*—

4 cwt. mineral superphosphate
2 „ potash salts.
2 „ sulphate of ammonia or nitrate of soda.

(3)—*For grass lands deficient in potash*—

2 cwt. mineral superphosphate.
1 „ sulphate of ammonia.
2 „ calcined kainite

(4)—*Manure for tea, coffee and vines*—

30 per cent. of soluble alkalies, chloride of potassium and sodium, and sulphate of potash.
20 „ „ lime and magnesia.
7 „ „ Phosphoric acid, equal to 15 per cent. of phosphate of lime.

The remainder being sulphuric acid, iron carbon dioxide, organic nitrogenous matter and silica.

The composition of these special manures is varied according as the requirements of the crop and the nature of the soil are believed to stand in need of particular substances. The quantities given in (1), (2) and (3) are laid on for each acre; No. (4) is applied at the rate of ten cwt. per acre.

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Ichaboe guano.	Dried blood.
Nitrate of soda.	Refuse of the bodies of fish and other animals.
Sulphate of ammonia.	

POTASH MANURES.

Kainite or crude potash.	Muriate of potash.
Calcined kainite.	Sulphate of potash.

PHOSPHATIC MANURES.

Dissolved bones.	Mineral superphosphate.
Ground bones.	Bone superphosphate.
Ash of bones.	A mixture of bone and mineral superphosphate.
Apatite.	Phosphatic guano.

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(2)—*Potato manure*—

6 cwt. mineral superphosphate.
2 „ potash salts.
2 „ sulphate of ammonia or nitrate of soda.

(3)—*For grass lands deficient in potash*—

2 cwt. mineral superphosphate.
1 „ sulphate of ammonia.
2 „ calcined kainite.

(4)—*Manure for tea, coffee and indigo*—

30 per cent. of soluble alkalies, chloride of potassium and sodium, and sulphate of potash.
20 „ „ lime and magnesia.
7 „ „ Phosphoric acid, equal to 15 per cent of phosphate of lime.

The rest under being sulphuric acid, iron carbon dioxide, organic nitrogenous matter and silica.

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Manures have not exhausted their usefulness when they have supplied, directly, plant-food. They exercise important chemical and physical influences on the soil, some of which have been already noticed, and although, as yet, they are but imperfectly understood, the value of their action is becoming day by day more clearly realised. Farm manure and green manures, which consist largely of decaying vegetation, are, during the process of decomposition, giving off large quantities of carbon-dioxide and other gases which act on the minerals contained in the soil, at a depth, and in positions where the carbon-dioxide of the air does not find a ready entrance. In this way they materially aid the disintegration of the particles of the soil and the liberation of soluble plant-foods. They affect the physical properties of soils. Heavy clays are rendered lighter and easier to work; each straw is an underground drain [illegible] ing moisture and air where they would not otherwise easily find their way

R. P. R.—Govt. Rev. & Agri. Dept. Press—No. 624—9. 6. 33

Form for reporting Manure Experiments.

1	2	3	4	5	6	7		8		9		10
[illegible]	[illegible]	Kind of [illegible]	Kind of manure, if any	* Weight of manure per acre	Whether irrigated, if not, give approximate rainfall	Yield per acre in maunds		Gross increase or decrease per acre as compared with ordinary unmanured lands.		Percentage of increase or decrease per acre.		Remarks.
						Grain, &c.*	Straw*	Grain, &c.*	Straw.*	Grain, &c.*	Straw.*	

* To be altered according to the nature of the crop

[illegible] Press [illegible] 1921—7-3-21 20

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R. Pitt.—Hons., Bot. & Agri. Dept. Press.—No. 624—9-7-09—225

Form for reporting Manure Experiments.

[illegible]	3	4	5	6	7		8		9		10
[illegible]	[illegible]	Kind of manure if any	* Weight of manure per acre	Whether irrigated, if not, give approximate rain fall	Yield per acre in maunds.		Gross increase or decrease per acre as compared with ordinary unmanured lands.		Percentage of increase or decrease per acre		Remarks.
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[illegible] Press [illegible] 678—7 2-80 200

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[illegible]	Kind of soil	Kind of crop	Kind of manure, if any	* Weight of manure per acre	Whether irrigated, if not, give approximate rain fall.	Yield per acre in maunds		Gross increase or decrease per acre as compared with ordinary unmanured lands.		Percentage of increase or decrease per acre.		Remarks.
						Grain, &c.*	Straw.*	Grain, &c.*	Straw.*	Grain, &c.*	Straw.*	

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[illegible] Home [illegible] & [illegible] Dept Press—No 622 & 623 -7 2-89—200

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R. D. H.—Hence, Rev. [illegible]

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[illegible]	[illegible]	* Weight of manure per acre	Whether irrigated or not, and approximate rainfall	Yield per acre in maunds				Gross increase or decrease per acre as compared with ordinary unmanured lands.		Percentage of increase or decrease per acre				Remarks.
				Grain, &c.*	Straw.*	Grain, &c.*	Straw.*	Grain, &c.*	Straw.*	Grain, &c.*	Straw.*			

* To be entered according to the nature of the crop

403 A.

Agriculture (Experiments)

Resolution of the Govt of India in the Home, Rev & Agri: Dept (Agriculture and Horticulture) No 52/21 & 12 dated 17 Jan/80 [illegible] Experiments [illegible] Bangalore, Saharanpur & Lakhimpur [illegible] Experiments [illegible] Bangalore, Saharanpur & Lakhimpur [illegible] similar experiments [illegible] in other parts of India by officers in charge of public gardens, jail gardens or Govt or municipal farms, directing that a careful record of such experiments should be kept & an account of them including a table of statistics in the form which they forward should form a part of the annual reports furnished by such officers & that copies of these reports shd be forwarded by Local Govts & Administrations, the Govt of India, to that Dept; observing that the most useful experiments would be those which have for their object the improvement of processes already adopted by cultivators or the utilization as nutritive manures of the common products of the country, and pointing out how they should be conducted.

Rec:

Copies of the Resolution of the Govt of India relative experiments should be forwarded for the information & guidance of the Commr in Sind, the Commr N.D. Division, the Collr & District or President of Municipal Committee, the Inspector General of Prisons, the Municipal Commr of Bombay, the Superintendents of the experimental farms at Bhagjan & Saharanpur & the Supdt Botanical gardens, Ganesh Khind.

[illegible] 13/2/80

[illegible] 19.2.80

Hon. Mr. Ashburner

[illegible] 12

No. 1205.

EXTRACT from the Proceedings of the Government of Bombay in the Revenue Department, dated 6th March 1880.

Read the following Resolution of the Government of India and its accompaniments :—

No. 2—62-71.

Extract from the Proceedings of the Government of India in the Home, Revenue and Agricultural Department (Agriculture and Horticulture),—under date Fort William, the 12th February 1880

READ—

A report by the Superintendent of the Experimental Farm at Bangalore, for the half-year ending the 31st December 1878, regarding certain experiments made with cattle manure in the cultivation of Queensland maize

Read also—

An article in the *Indian Agriculturist* of the 1st September 1879, on the subject of manures and their classification

OBSERVATIONS.

THE Governor General in Council is of opinion that experiments, similar to those made on the Bangalore Farm, might usefully be undertaken in other parts of India by officers in charge of public gardens, jail gardens or Government or Municipal farms. A careful record of such experiments should be kept, and an account of them, including a table of statistics in the accompanying form, should form a part of the annual reports furnished by such officers. Copies of these reports should be forwarded by Local Governments and Administrations to this Department.

2 The most useful experiments would be those which have for their object the improvement of processes already adopted by cultivators, or the utilization as nutritive manures of the common products of the country. They should be conducted on a uniform system, and should consist (1) in cultivating equal areas of manured and unmanured soil of the same kind, under the same conditions, with the same crop (2) in cultivating different crops in equal areas of manured and unmanured soil of the same kind, under the same conditions. (3) in varying the soil, other things being equal. (4) in varying the kind or amount of the manure, other things being equal (5) in varying the conditions, as of the presence or absence of irrigation

Ordered that a copy of this Resolution and of the papers read in the present [illegible] to the Local Governments Administrations [illegible]

* [illegible] Bombay Presidency, North Western [illegible] Northern Division at Hyderabad

403 A.

Agricultural Experiments.

Resolution of the Govt of India in the Home, Rev & Agri: Deptt. (Agriculture and Horticulture) No 62/71 & 12/37 forwarding report on experiments ~~[illegible]~~ ~~that they are of a character that experiments~~ ~~[illegible]~~ 5,234 in value of latex yielding ficus elastica by the Bangalore Farm ~~might usefully be undertaken~~ in other parts of India by officers in charge of public gardens, jail gardens or Govt or municipal farms; directing that a careful record of such experiments should be kept & an account of them including a table of statistics in the form which they forward should form a part of the annual reports furnished by such officers & that copies of these reports shd be forwarded by Local Govts & Administrations to the Govt of India ~~that Deptt~~; observing that the most useful experiments would be those which have for their object the improvement of processes already adopted by cultivators or the new utilization as nutritive manures of the common products of the country, and pointing out how they should be conducted.

Resn.

Copies of the Resolution of the Govt of India & its accompaniments should be forwarded for the information & guidance of the Commissioner in Sind, the Commrs N.D. & Divisional, the Collrs & Districts & Presidents of Municipal Committees, the Inspector General of Prisons, the Municipal Commr of Bombay, the superintendents of the experimental farms at Bhagpat & Lahore & the Supt Botanical gardens, General Khind.

Hill 18/2/80

Vincent 19.2.80

Hon. Mr. Ashburner

Kle

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[illegible] Order [illegible] copy of this Resolution, [illegible] and of the papers [illegible] the preamble, be forwarded [illegible] Local Governments [illegible] Administrations" for [illegible] information and guidance

[illegible] Bombay, Bengal, North Western Provinces [illegible] Central Provinces, Burma, Assam [illegible] Coorg, Resident in Hyderabad

403 A.

Agriculture & Improvements

Resolution of the Govt of India in the Home, Rev & Agri. Dept (Agriculture and Horticulture) No. 62/21 & 22 dated 17 Feb 1880 forwarding copy of a report on an experiment ~~[illegible]~~ of the value of fallow ~~[illegible]~~ 6 & 28 in the value of latex yielding ~~[illegible]~~ in the Bangalore Farm, (stating that similar experiments might usefully be undertaken in other parts of India by officers in charge of public gardens, Jail gardens or Govt or Municipal farms, directing that a careful record of such experiments should be kept & an account of them including a table of statistics in the form which they forward should form a part of the annual reports furnished by such officers & that copies of these reports shd be forwarded by Local Govts & Administrations to the Govt of India ~~that Dept~~, observing that the most useful experiments would be those which have for their object the improvement of processes already adopted by cultivators or the utilization as nutritive manures of the common products of the country, and pointing out how they should be conducted

Recd.

Copies of the Resolution of the Govt of India & its accompaniments should be forwarded for the information & guidance of the Commissioner in Sind, the Commrs N.E. & S. Divisions, the Collrs of Districts & Presidents of Municipal Committees, the Inspector General of Prisons, the Municipal Commrs of Bombay, the Superintendents of the experimental farms at Bhagwan & Saleem & the Supt Botanical gardens, Ganesh Khind.

Hill 18/2/80

Mugent 19.2.80

Hon. Mr. Crosthwaite

[illegible] 21/2

Rec.

No. 1205.

EXTRACT from the Proceedings of the Government of Bombay in the Revenue Department, dated 6th March 1880.

Read the following Resolution of the Government of India and its accompaniments:—

No. 2—62-71.

Extract from the Proceedings of the Government of India in the Home, Revenue and Agricultural Department (Agriculture and Horticulture),—under date Fort William, the 12th February 1880

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Read also—

An article in the *Indian Agriculturist* of the 1st September 1879, on the subject of manures and their classification

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[illegible] Government [illegible] this Resolution and of the papers [illegible] the preamble be forwarded [illegible] Local Governments or Administrations for [illegible] guidance [illegible]

203 A.

121 & 5

Agricultural Experiments

Resolution of the Govt. of India in the Home, Revd & Agri: Deptt (Agriculture and Horticulture) No 62/21 & 12 dated 27 July 1880 [illegible] report on an experiment [illegible] [illegible] [illegible]

No. 1205.

EXTRACT from the Proceedings of the Government of Bombay, in the Revenue Department, dated 6th March 1880.

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[illegible] Ordered that a copy of this Resolution, and of the papers noted in the preamble, be forwarded to the Local Governments and Administrations* for [illegible] and guidance.

* [illegible] North-Western Provinces [illegible] Burma, Assam, [illegible] Coorg, Rest[illegible] Hyderabad

Report on an experiment of the value of cattle manure during half-year ending 31st December 1878.

THE following experiment has been made for the purpose of bringing forward the difference in value of manure under the system of cattle-box manufacture adopted on this farm and of the two common methods of treatment by the ryots in this Province.

The cattle-box system of housing cattle is briefly as follows: Over a pit sunk about two and a half feet in the ground, a shed is erected with eaves overhanging in such a manner that neither the sun's rays can penetrate (except at an oblique angle in the morning and evening) to dry up the manure nor the rain fall on or run into the pit to unduly wet the contents and render it too moist for the cattle to rest on. The cattle are housed in this shed at night, each in separate compartment, and were supplied, in the case of the present experiment, with grass only. In the morning a little litter, stalks of plants, leaves or unconsumed food, is strewn over the box, especially where the dung has been dropped, and nothing is removed until the pit is full, when the bulk of the manure is carted away to the field. The top layers not decomposed are replaced in the bottom of the empty pit as litter. In this way twenty loads of manure per annum, containing the whole of the dung and urine dropped while the animal is not at work, are secured; and bulk is obtained by utilizing any waste substance for litter, thus adding a large amount of organic matter, which, placed in the soil, acts as a powerful retainer of moisture.

The cow-dung employed in plot No. II. was obtained from a grazing-ground and placed in a heap for some months until required—the common Native method of storing manure not required for fuel. The ashes were the result of burning an equal weight of the same cow-dung representing the residuum from the "brelly," or cow-dung cake, used for fuel throughout India.

The experiment was to test the comparative value of equal weights of each manure. Had the experiment taken the form of using the total amount of manure obtained from a bullock in the same time, the result would have been more striking.

It may be remarked that dung was from mature cattle, fed only on grass without any gram, oil-cake, or other food to enrich the manure.

The crop on which the experiment was tried was Queensland maize, grown on a poor light sandy loam. The seed was sown in rows two feet apart on the 18th April, and harvested for the sale of the green cobs 18th of August.

The rain-fall during the period of growth was 3·85 inches, but this was supplemented with occasional irrigation from a well as required.

The following are the results per acre:—

Number of plot.	Manure per acre	Green cobs	Percentage of increase over unmanured plot	Fodder	Percentage of increase over unmanured plot
		lbs		lbs	
Plot No. I.	Cattle-box manure 5½ tons ...	5,870	+71	9,710	+71
„ No. II.	Dry cow-dung 5½ tons	4,480	+33	7,150	+26
„ No. III. ..	Ashes from 5½ tons cow dung	4,620	+37	4,430	−[illegible]
„ No. IV. ...	Blank	3,360		5,650	

The small quantity of manure employed, the minimum of water used, and the comparatively poor soil to which they were applied, fully account for the slight yield, but the comparative result is very clear.

The yield of the cattle-box manure, both in cobs and fodder of 74 per cent and 71 per cent., respectively, over the unmanured plot, is remarkably high, the manure being well rotted and taken from the lowest part of the pit where it was thoroughly saturated with urine.

The slight increase of four per cent. given by the ashes over cattle-dung manure is due to the forcing action of the former, the whole of the constituents being released from the organic combinations they were held as insoluble vegetable matter But as the dung of an animal has been proved by careful experiments in Europe to contain only about one-fourth of the plant-food voided in both dung and urine, it is not surprising to find the result of its action far less energetic than when both are combined, as in the case of the cattle-box manure. The actual decrease of fodder, when ashes were employed, is curious. The plant probably suffered under the too stimulating action of ashes from insufficient moisture, though the amount given, when aided by the organic matter combined both in the dried cow-dung and the cattle-box manure, was adequate. The frequent waterings asserted as necessary for maize by Native gardeners round Bangalore are probably largely due to their partiality for ashes as a manure, for on this farm where cattle-box manure is chiefly employed, and where a deeper cultivation is given, crops are raised with a considerably smaller amount

F. E HARMAN, M.R.A.C., F.C.S

Superintendent, Experimental Farm, Bangalore

MANURES AND THEIR CLASSIFICATION

There are three methods adopted to maintain and improve the fertility of soils

1st—Fallowing.

2nd.—Rotation of crops.

3rd—Manuring

The soil contains an inexhaustible supply of mineral food, not of course all available at once, but only so much of it as the natural processes of disintegration, mechanical and chemical, are constantly liberating It may, we think, be as safely accepted that the air, water, and the soil contain an equally inexhaustible store of organic food

It has been held that ammonia (nitrogen) exists in nature in such quantities that, with farmyard manure, it is quite unnecessary to supply it (nitrogen) in artificial manures

The following experiment, conducted by Mr Lawes, extending over eighteen years, we think may be held as conclusive in the matter

Two plots of land, side by side, for eighteen years were manured alternately with ammonia salts and phosphate of lime In 1852 plot No 1 was treated with ammonia, plot No. 2 received superphosphate. In 1853 No. 1 got superphosphate, and No. 2 ammonia; and so on for eighteen years Thus, each plot had been nine times manured with ammonia and nine times with mineral phosphates. Over the whole time the average produce of both was exactly the same, 24⅝ bushels, but the average of the eighteen crops grown by mineral manure alone, whether on plots No 1 or No 2, was only 17¼ bushels, whilst the average of the 18 crops grown on either plot by ammonia salts was 31⅝ bushels, being an increase of nearly 14 bushels per acre more each year These results, confirmed by Voelcker, and tested by the practice of agriculturists in a general way, may be safely accepted as conclusive

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The cow-dung employed in plot No. II. was obtained from a grazing-ground and placed in a heap for some months until required—the common Native method of storing manure not required for fuel. The ashes were the result of burning an equal weight of the same cow-dung representing the residuum from the "brelly," or cow-dung cake, used for fuel throughout India.

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The crop on which the experiment was tried was Queensland maize, grown on a poor light sandy-loam. The seed was sown in rows two feet apart on the 18th April, and harvested for the sale of the green cobs 13th of August.

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Two plots of land, side by side, for eighteen years were manured alternately with ammonia salts and phosphate of lime. In 1852 plot No. 1 was treated with ammonia, plot No. 2 received superphosphate. In 1853 No. 1 got superphosphate, and No. 2 ammonia, and so on for eighteen years. Thus, each plot had been nine times manured with ammonia and nine times with mineral phosphates. Over the whole time the average produce of both was exactly the same, 24¾ bushels, but the average of the eighteen crops grown by mineral manure alone, whether on plots No. 1 or No. 2, was only 17¾ bushels, whilst the average of the 18 crops grown on either plot by ammonia salts was 31¾ bushels, being an increase of nearly 14 bushels per acre more each year. These results, confirmed by Voelcker, and tested by the practice of agriculturists in a general way, may be safely accepted as conclusive.

Report on an experiment of the value of cattle manure during half-year ending 31st December 1878.

The following experiment has been made for the purpose of bringing forward the difference in value of manure under the system of cattle-box manufacture adopted on this farm and of the various various methods of treatment by the ryots in this Province.

The cattle-box system of housing cattle is briefly as follows: Over a pit sunk about two and a half feet in the ground, a shed is erected with eaves overhanging in such a manner that neither the sun's rays can penetrate (except at an oblique angle in the morning and evening) to dry up the manure nor the rain fall on or run into the pit to unduly wet the contents and render it too moist for the cattle to rest on. The cattle are housed in this shed at night, each in separate compartment, and were supplied, in the case of the present experiment, with grass only. In the morning a little litter, stalks of plants, leaves or unconsumed food, is strewn over the box, especially where the dung has been dropped, and nothing is removed until the pit is full, when the bulk of the manure is carted away to the field. The top layers not decomposed are replaced in the bottom of the empty pit as litter. In this way twenty loads of manure per annum, containing the whole of the dung and urine dropped while the animal is not at work, are secured; and bulk is obtained by utilizing any waste substance for litter, thus adding a large amount of organic matter, which, placed in the soil, acts as a powerful retainer of moisture.

The cow-dung employed in plot No. II. was obtained from a grazing-ground and placed in a heap for some months until required—the common Native method of storing manure not required for fuel. The ashes were the result of burning an equal weight of the same cow-dung representing the residuum from the "brelly," or cow-dung cake, used for fuel throughout India

The experiment was to test the comparative value of equal weights of each manure. Had the experiment taken the form of using the total amount of manure obtained from a bullock in the same time, the result would have been more striking.

It may be remarked that dung was from mature cattle, fed only on grass without any gram, oil-cake, or other food to enrich the manure.

The crop on which the experiment was tried was Queensland maize, grown on a poor light sandy loam. The seed was sown in rows two feet apart on the 18th April, and harvested for the sale of the green cobs 18th of August.

The rain-fall during the period of growth was 3·85 inches, but this was supplemented with occasional irrigation from a well as required.

The following are the results per acre:—

Number of plot.	Manure per acre	Green cobs	Percentage of increase over unmanured plot	Fodder	Percentage of increase over unmanured plot
		lbs.		lbs	
Plot No. I.	Cattle-box manure 5½ tons ...	5,870	+74	9,710	+71
„ No. II.	Dry cow-dung 5½ tons	4,480	+33	7,100	+26
„ No. III. ...	Ashes from 5½ tons cow-dung	4,620	+37	4,480	[illegible]
„ No. IV.	Blank	3,360		5,650	

The small quantity of manure employed, the minimum of water used, and the comparatively poor soil to which they were applied, fully account for the light yield, but the comparative result is very clear.

The yield of the cattle-box manure, both in cobs and fodder of 74 per cent. and 71 per cent., respectively, over the unmanured plot, is remarkably high, the manure being well rotted and taken from the lowest part of the pit where it was thoroughly saturated with urine.

The slight increase of four per cent. given by the ashes over cattle-dung manure is due to the forcing action of the former, the whole of the constituents being released from the organic combinations they were held as inassimilable vegetable matter. But as the dung of an animal has been proved by careful experiments in Europe to contain only about one-fourth of the plant-food voided in both dung and urine, it is not surprising to find the result of its action far less energetic than when both are combined, as in the case of the cattle-box manure. The actual decrease of fodder, when ashes were employed, is curious. The plant probably suffered under the too stimulating action of ashes from insufficient moisture, though the amount given, when aided by the organic matter combined both in the dried cow-dung and the cattle-box manure, was adequate. The frequent waterings asserted as necessary for maize by Native gardeners round Bangalore are probably largely due to their partiality for ashes as a manure, for on this farm where cattle-box manure is chiefly employed, and where a deeper cultivation is given, crops are raised with a considerably smaller amount.

F. E. HARMAN, M.R.A.C., F.C.S.,
Superintendent, Experimental Farm, Bangalore.

MANURES AND THEIR CLASSIFICATION.

THERE are three methods adopted to maintain and improve the fertility of soils

1*st*.—Fallowing.

2*nd*.—Rotation of crops

3*rd*.—Manuring.

The soil contains an inexhaustible supply of mineral food, not of course all available at once, but only so much of it as the natural processes of disintegration, mechanical and chemical, are constantly liberating. It may, we think, be as safely accepted that the air, water, and the soil contain an equally inexhaustible store of organic food.

It has been held that ammonia (nitrogen) exists in nature in such quantities that, with farmyard manure, it is quite unnecessary to supply it (nitrogen) in artificial manures

The following experiment, conducted by Mr Lawes, extending over eighteen years, we think may be held as conclusive in the matter

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Whatever may have been the practice in times gone by, when land was cheap, and held on favourable terms, with comparatively little machinery in use for agricultural purposes, and when competition had not assumed the proportions that render it imperatively necessary for the agriculturist to avail himself of every legitimate means of increasing the weight and quality of crops,—when agriculture had no existence as science, except in the brain and practice of a few men much in advance of their time, like B[illegible]ire, of Cumberland, who sowed those ideas which the clear-headed tenant-farmers of Cumberland and the North have certainly not let die, and who side by side with Joseph Hume, in the days long before liberalism became fashionable, protested, session after session, against extravagance, corruption, and incompetency,—certainly now-a-days, when the struggle for existence and the survival of the fittest are facts brought home to most men's consciousness, every possible means that may fairly be used to meet the exigencies of the present ought to be carefully studied and brought into practice.

Manures may be classified in several ways, according to the view-point of the classifier. They may be classified in the three following ways, with sufficient exactitude to answer most purposes: *1st*, as to their origin; *2nd*, as to their composition; *3rd*, as to their uses

First, as to their *origin*; they may be regarded as either 1st, natural; or 2nd, artificial. This division makes a clear distinction between all substances used as manures which are produced without man's intervention, and those which are the product of the ingenuity of man. Under the former, natural manures, such widely different substances as farm manures, guano, nitrate of soda, lime, and natural products such as these, are classed together, although in another view, guano, nitrates, lime, &c., though natural products, are nevertheless artificial manures. More correctly speaking, however, the term artificial might be used to indicate those substances manipulated by the art of man to serve his purposes; and they would embrace every manufactured substance introduced as a fertilizer, such as dissolved bones, and mineral and bone superphosphates of all kinds, as well as those compounds prepared by manufacturers to meet the wants of particular crops—tea, indigo, coffee, grass, potato, turnips, &c., and sold under various names. Manures might also be classified either as to their origin or composition, as—1st, animal; 2nd, vegetable; or 3rd, mineral: a classification of this kind, however, is of so vague and general a character as to render it of little practical use.

Second.—Manures may be classified as to their composition, as either—1st, general; or 2nd, special. A general manure is one which will supply to the soil, and consequently to the crops grown on the soil, sufficient plant-food of all kinds, to keep up the continual fertility of the land. Beef, mutton, wool, wheat, indigo, tobacco, tea, coffee, &c., cannot be taken year by year from the soil, cannot be sold off the land, and leave it in the same position it was before this process began. The speed with which crops and products of various kinds are prepared for the market is much in advance of the slow natural agencies which are continually acting on the dormant constituents of the soil, and changing them into soluble plant-food. A general manure prevents, or at least retards, the consumption of the plant-food in the soil, and makes it possible to go on producing crop after crop, with as much speed as the natural laws which govern its production will admit of. If added in sufficient abundance, it may enrich an otherwise barren or profitless soil, and so enable it to bear a crop that will more than pay the cost of production. General manures, then, must always be the most important, and no others would be need were it possible to obtain manures with the exact composition of the crops to be raised; this, however, cannot be accomplished, and so it comes to pass that there are always accumulating in the soil vast stores of plant-food, put in year by year in general manures and not removed by successive crops; hence the use of some special manure which, while containing only one important food, deficient in the soil, will enable the crop to take up the abundance of the others which the soil has accumulated or the general manure supplied. Farm manure stands at the head of all general manures. It thoroughly restores to a soil the power of reproducing the same crops. If supplied in sufficient quantities, it completely arrests exhaustion, and restores fertility. It consists of the straw used for litter, and the solid and fluid excre-

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2nd.—Special manures are those which contain chiefly one plant-food, though others may be present. They are only fitted to supply plant-food of a special kind, such as potash, nitrogen or phosphorous. It must not, however, be supposed that they do nothing more; in every special manure there are always other ingredients, which, while they add nothing, or very little, to their market value, are of great use to the soil in helping to bring about its disintegration; and which play important parts in the decomposition and formation of compounds in the soil. It should, however, be borne in mind that they are valuable chiefly, if not solely, from a commercial point of view, for their potash, nitrogen or phosphorous, and that they should be supplied to soils where there is good reason to believe that these substances are deficient, or where their application would bring into usefulness other plant-foods in which the land abounds.

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The following are the chief special manures in the market. It should be borne in mind that special is here used in opposition to general, and that the designation artificial is much more commonly applied to them:.

ARTIFICIAL OR SPECIAL MANURES.

Ammoniacal or Nitrogenous Manures.

Peruvian guano.	Manure cakes (rape).
Ohlendorf guano.	Wool manure (shoddy).
Ammonia-fixed guano.	Grease cakes (refuse).
Ichaboe guano.	Dried blood.
Nitrate of soda.	Refuse of the bodies of fish and other animals.
Sulphate of ammonia.	

POTASH MANURES.

Kainite or crude potash.	Muriate of potash.
Calcined kainite.	Sulphate of potash.

PHOSPHATIC MANURES.

Dissolved bones.	Mineral superphosphate.
Ground bones.	Bone superphosphate
Ash of bones.	A mixture of bone and mineral superphosphate.
Apatite.	Phosphatic guano.

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3rd.—Corrective manures are those whose application to land acts beneficially on some injurious substance, such as an acid, present in undue quantities in the humus, and it may be by liberating the double silicates already referred to in a former article, thus provide abundant food for a higher and more nutritious class of indigenous plants, which ultimately drive out less desirable ones. The judicious and combined application of salt and lime to properly-drained marsh and low-lying pasture lands is something marvellous and requires to be seen before it can be realized in its entirety.

The uses of lime and salt as corrective manures are of the very highest value, and the application of artificial manures of the costliest kind would probably be utterly useless, a waste of money and labour, until a change had been effected on the indigenous vegetation of the land. In salt the agriculturist possesses a substance by means of which he can regulate, to a great extent, the growth of the stem in all cereals.

Manures manufactured and sold to suit the requirements of special crops are probably increasing in demand. There are, however, so many conditions necessary to success in producing an article of this kind, that there need be no wonder if they sometimes do not come up to the expectations of the purchaser.

Agriculturists themselves are probably the best parties to observe and experiment on the value of manures prepared to meet the requirements of special crops. It is only just to manufacturers to say that excellence in the preparation of special manures has been arrived at by very careful researches, and by the

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SPECIAL MANURES

(1)—*For wheat, barley or rye*—

2½ cwt. mineral superphosphate.
2 „ sulphate of ammonia

(2)—*Potato manure*—

4 cwt. mineral superphosphate.
2 „ potash salts.
2 „ sulphate of ammonia or nitrate of soda.

(3)—*For grass lands deficient in potash*—

2 cwt. mineral superphosphate.
1 „ sulphate of ammonia.
2 „ calcined kainite.

(4)—*Manure for tea, coffee and indigo*—

30 per cent. of soluble alkalies, chloride of potassium and sodium, and sulphate of potash.
20 „ „ lime and magnesia.
7 „ „ Phosphoric acid, equal to 15 per cent. of phosphate of lime.
The remainder being sulphuric acid, carbon dioxide, organic nitrogenous matter and silica.

The composition of these special manures is varied according as the requirements of the crop and the nature of the soil are believed to stand in need of particular substances. The quantities given in (1), (2) and (3) are laid on for each acre; No. (4) is applied at the rate of ten cwt. per acre.

In the classification in common use, the term artificial is confined to that class of manures which have come into use during the last forty years. Some of these are in reality natural products, such as guano, nitrate of soda, and kainite, and are misnamed when called artificial, the phosphates of lime and the ammonia sulphates are manufactured products, and are correctly named when called artificial. Limes, chalks and marls, which have been in use for ages, are correctly called natural. Farm manures are classed alone. Green manures have been in use in various parts of Europe from very early times. A crop is grown on the soil which is not taken off, but ploughed in. In Northern Germany farmers plough in spurrey or lupin to obtain a good crop of rye from a light sandy soil. In America clover and Indian corn are used for this purpose. The plants best suited for green manuring are those which in a given time will produce the greatest amount of valuable available plant-food with least labour and cost. In England spurrey mustard and turnips are used. Green manuring adds no new mineral matter to the soil, it simply brings to the surface from greater or less depth material already existing, and spreads it out to meet the requirements of the succeeding crop. In addition to this, the crop used as a green manure extracts from the air valuable organic substances which are given up to the soil when the decomposition of the ploughed-in crop sets in. In green manuring there is no accumulating of mineral food, and a clear gain in organic matters.

Manures have not exhausted their usefulness when they have supplied directly plant-food. They exercise important chemical and physical influences on the soil, some of which have been already noticed, and although, as yet, they are but imperfectly understood, the value of their action is becoming day by day more clearly realized. Farm manure and green manures, which consist largely of decaying vegetation, are, during the process of decomposition, giving off large quantities of carbon-dioxide and other gases which act on the minerals contained in the soil, at a depth, and in positions where the carbon-dioxide of the air does not find a ready entrance. In this way they materially aid the disintegration of the particles of the soil and the liberation of soluble plant-foods. They effect the physical properties of soils. Heavy clays are rendered lighter and easier to work each straw is an underground drain conveying moisture and air where they would not otherwise easily find their way.

The following are the chief special manures in the market. It should be borne in mind that special is here used in opposition to general, and that the designation artificial is much more commonly applied to them:

ARTIFICIAL OR SPECIAL MANURES

Ammoniacal or Nitrogenous Manures

Peruvian guano.	Manure cakes (rape).
Ohlendorf guano	Wool manure (shoddy)
Ammonia-fixed guano.	Grease cakes (refuse)
Ichaboe guano	Dried blood
Nitrate of soda.	Refuse of the bodies of fish and other animals.
Sulphate of ammonia.	

POTASH MANURES.

Kainite or crude potash.	Muriate of potash
Calcined kainite.	Sulphate of potash.

PHOSPHATIC MANURES.

Dissolved bones	Mineral superphosphate
Ground bones	Bone superphosphate.
Ash of bones	A mixture of bone and mineral superphosphate
Apatite	Phosphatic guano

There remains to be shortly noticed the classification of manures as to their uses. With regard to the effect produced on the soil and crop, manures may be classified as—1st, stimulating; 2nd, nutritive, and 3rd, corrective. All ammoniacal manures may be classed as stimulating (see table above), and in its general action on the soil, lime may also fall under this head. Nutritive manures are those whose special function it is to supply a variety of plant-food, so that farm manures, general manures, would be classed under this head. There is, of course, no manure which does not supply plant-food, of some kind, in more or less abundance; but the term nutritive could not be applied with correctness to the artificial or special manures enumerated above, whose special functions are by supplying one kind of plant-food to enable the crop to take up large quantities of others stored in the soil. Stimulating manures, instead of retarding or preventing the exhaustion of the soil, quicken it, by enabling the crop to take up greater quantities of plant food in a shorter period than without their use could be effected.

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2½ cwt. mineral superphosphate.
2 „ sulphate of ammonia.

(2)—*Potato manure*—

4 cwt. mineral superphosphate.
2 „ potash salts.
2 „ sulphate of ammonia or nitrate of soda.

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2 cwt. mineral superphosphate.
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Kainite or crude potash.	Muriate of potash.
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Dissolved bones.	Mineral superphosphate.
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Form for reporting Manure Experiments

1	2	3	4	5	6	7		8		9		10
Number of plot.	Kind of soil.	Kind of crop.	Kind of manure, if any.	Weight of manure per acre.	Whether irrigated, if not, give approximate rain-fall.	Yield per acre in maunds.		Gross increase or decrease per acre as compared with ordinary unmanured lands.		Percentage of increase or decrease per acre.		Remarks.
						Grain, &c.*	Straw.*	Grain &c.*	Straw.*	Grain, &c.*	Straw.*	

* To be altered according to the nature of the crop

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RESOLUTION.—Copies of the Resolution of the Government of India and its accompaniments should be forwarded for the information and guidance of the Commissioner in Sind, the Commissioners, Northern, Central and Southern Divisions, the Collectors of Districts and Presidents of Municipal Committees, the Inspector General of Prisons, the Municipal Commissioner of Bombay, the Superintendents of the Experimental Farms at Bhadgaon and Hyderabad, and the Superintendent, Botanical Gardens, Ganesh Khind.

Acting Secretary to Government.

To

The Commissioner in Sind.
The Commissioner N. D.
The Commissioner C. D.
The Commissioner S. D.
The Collectors and Presidents of Municipal Committees (including those in Sind).
The Superintendents in Sind.
The Inspector General of Prisons.
The Municipal Commissioner, Bombay.
The Superintendent of the Experimental Farm, Bhadgaon.
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TOTAL EXPOSURES

45

END

END

START

START

START

DEPARTMENT OF ARCHIVES

GOVERNMENT OF MAHARASHTRA, MUMBAI.

NAME OF RECORD : REVENUE DEPARTMENT VOL.

NO : 11 – 1250

YEAR : 1883

EXPOSED BY : ANIL SAWANT

DATE : 06/10/2007

250

F 8 8

Rev: Dept

No. 1250

Administration Effect

Belgium

250

258

158

Rev. Dept
No. 1950

Administration Reform

Belgium

Sobre

257

250

750

Rev: Dept.

No. 1250

Administration Reform

Belgium

Inactive

250

R. 250

750.

Rec: Dept.
No. 1250

Administration Report
Belgaum

R. 50

No. 1664 of 1880

From Revenue Department

To, Arthur Crawford Esquire.
Commissioner S.D.

John Nugent Esquire
Secretary to Government

Sir, Poona 29th July 1880

RECD AUG 2 1880

The Belgaum Administration Reports, dated 24th inst, were received by me on the 27th instant, late as usual the reasons assigned being satisfactory to the Collector but not so to myself. In a separate explanatory letter appended, the Collector states that the bulk of the material for his own report was compiled by Mr. Fleet his 1st Assistant temporarily in charge during his own illness and absence from office on leave from the 10th to the 24th

Collector's no: 2012 dated 24th July 1880
First Asst Collector's no. 151 of 14th July 1880
Second Asst Collector's no. 173 of 16th July 1880
District Deputy Collector's no 188 of 17th July 1880

Vol 11

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Instant. From this it is clear that the Collector put off the preparation of his report to the last moment, and of course it is late.

2 All the high officials, the Collector his 1st Assistant and Supernumerary Assistant Collector, have been more than a year in the District and continuously at work during the past year except that the Collector took a month's leave in November and December. It is reasonable, therefore, to look for a marked improvement in the very defective administration commented on by Government and myself last year. The expectation however, has, I regret, to say, been by no means realised.

3 The rainfall was abundant and seasonable and on the whole, the

Para 4

the season was decidedly favourable. The fact that thermometers have been placed at three new Rural Stations — (Aiken, Chandpur and Lucknow) should have been mentioned. The rate per mille of Birth and deaths respectively 21.37 and 37.97, should have been recorded. The mortality fell from 61,146 in 1877-78 to 29,600 in 1878-79. There was a little more attention to birth registration, but the Collector is rather vague on the subject

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2 All the high officials, the Collector, his 1st Assistant and Supernumerary Assistant Collector, have been more than a year in the District and continuously at work during the past year, except that the Collector took a month's leave in November and December. It is reasonable, therefore, to look for a marked improvement in the very defective administration commented on by Government and myself last year. The expectation, however, has, I regret to say, been by no means realised.

3 The rainfall was abundant and seasonable, and on the whole, the

Para 4

the season was decidedly favourable. The fact that thermometers have been placed at three new rural stations — (Hatkin, Chandyal and Kurgod) should have been mentioned. The rate per mille of Births and deaths, respectively 21.37 and 37.97, should have been recorded. The mortality fell from 61,846 in 1877-78 to 29,609 in 1878-79. There was a little more attention paid to birth registration, but the Collector is rather vague on the subject

4. The public health was generally good, and there was no epidemic. The attendance at the different dispensaries should have been separately stated. The water supply of the town of Bijapur must take precedence of every other scheme, even that for

Paras 6 & 9. 13 & 14.

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a dispensary. I satisfied myself personally on this point. Vaccination was much better attended to. The outturn of the crops was good, sugar cane being a bumper; there was an inconsiderable decrease in the number of carts and a large increase in horned cattle; prices are falling gradually; the demand for & rate of labour remained normal; the great fair of Yellamma was unusually crowded; the people are in better spirits, but the reaction from the Famine is not so marked as in Dharwar.

5. The Collector has omitted to state what was the yield of the capitation tax at the Yellamma fair; the statement at para 58

of

of the yettanima Municipal Funds apparently contains no mention of the capitation tax

Para 11 6 In the neighbouring District, Dharwar, Takavi advances under the old rules were freely solicited by the people and much good resulted thereby. The Collector of Belgaum however only advanced Rs 100 under the Land Improvement Act, and alleges that the rigidity of the rules for Takavi drove the needy ryots in preference to the Native Bankers. Why the same class of people should eagerly avail themselves of and appreciate the boon in Dharwar is not intelligible; and I am convinced that apathy and want of real interest on the part of the local authorities of Belgaum is the true

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explanation of the anomaly -

7. There is an error in Column 11 of the Statement, the difference between 88,857 and 100,520 is 11,663, not 11,740, as there shown. [Para 18.]

8. I do not understand why the lands of absconded ryots were not sold before the season was far advanced, because the authorities waited to see if any relations of these ryots would appear. On the whole I must condemn the delay as the result of their neglect. Had the lands been sold at the proper and reasonable time it is probable that most of the balances (Rs 3,000 on account of 1879-80.) due in the Parasgad Taluka would have been recovered. The Collector beyond alluding to the remissions [Paras 17, 18 & 19 and Collector's remark on w.r. & letter 8th para]

lately

lately sanctioned by Government has not taken the trouble to report in detail on the out-standing balances as has been done by other Collectors.

9 The heading of column 2 of the marginal table should
Para 20 be "Fine", not "Interest and fees for non-payment"

10 The Collector should report separately hereafter his
Para 22 proposals regarding the ferry toll at Qurl Hoder at present taken by the Inamdar. It must depend on the cost of making the deviation of the road, and the discussion is therefore premature and out of place in this report.

11 No information is given as to the increase in
Para 24 Forest area but

completeness of the accounts by -

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Paras 17, 18 & 19 and Collr's remark on his Fleet's 5th para

Lated.

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the new system of Departmental supply of firewood is stated to have resulted in the satisfactory increase of Rs 18,833 to the revenue.

12 The Stamp revenue on the whole yielded Rs 2[illegible]26 a trifle more than in the preceding year. The information regarding the License Tax Act is full and the balance satisfactorily explained.

13 The Collector has no Minors Estates in his charge under Act XX of 1864 Para 27

1 One sixth of the total number of village accountants (i.e. 148 out of 887) were punished, from which fact I must conclude, though the Collector does not say a word on the subject, that their general conduct has Para 28

been

Inspectors. With no special duties of any kind, Mr. Waddington's Assistants ought to be able to do much more in the way of Watan registration.

15th The amount of personal inspection performed by the Collector, Mr. Waddington, shews no improvement whatever on that done by himself and Mr. Bosanquet the previous year, except that he scrutinized 210 instead of 148 cases, tried by the Subordinate Magistracy. I find that he passed 208 days at Belgaum, 30 more days were taken up in leave, leaving a little over 4 months passed in tour. Where in were crowded the inspection of six hundred

Bros 29 & 47

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12 The Stamp revenue on the whole yielded Rs 2,8426 a trifle more than in the preceding year. The information regarding the License Tax Act is full, and the balance satisfactorily explained. Para 27

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15 The amount of personal inspection performed
Paras 39 & 47 by the Collector, Mr. Waddington, shows no improvement whatever on that done by himself and Mr. Bosanquet in the previous year, except that he scrutinized 210, instead of 45, cases, tried by the Subordinate Magistracy. I find that he passed 205 days at Belgaum, 30 more days were taken up in leave, leaving a little over 4 months, passed in tours wherein were crowded the inspection of six hundred and

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16 I have already expressed most unfavourably both of the Police and of Police administration in the Nyanza District. Para 48

17 The District Magistrate does not mention how the Police Patels holding commissions performed their duties, or how the village Police generally acquitted themselves. Para 49

18 The fact alleged that large numbers of persons still hold arms under old instead of new licenses, is not creditable either to the Magistracy or the Police. Para 57

19 I approve generally of the manner in which it is proposed to spend some of the large local Para 35

fund

fund balances, and I shall steadily discourage the construction of any but roads capable of use in the monsoon. The amount expended on the repair of fair weather tracks is again excessive and may surely be reduced with advantage. Until the line of the new Railways is finally determined I do not desire that the District Local Fund Committees of the Southern Tenasserim Country should commence new roads. But the Belgaum District Local Fund Committee [illegible] fairly [illegible] the [illegible] [illegible] the [illegible] [illegible] [illegible]

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important arterial communication from the top of the Phonda Ghat through Nipani into the heart of the Belgaum District. I shall shortly submit the scheme which ought to have been carried out many years ago when the Phonda Ghat was first constructed. For years past the track, for it is little better, has been barely passable for carts, and in many places it is dangerous.

The

Para 58 The Collector has omitted to add, as required by Standing orders, a Column to the statement of Municipal Funds, showing the closing balance in each Municipality. I find that after all nothing has been really done by the Irrigational Department towards a Survey for the water supply of Belgaum, and up to this moment the plans for improving the water works of Nipani have not reached me. The town of Belgaum has never been surveyed and little in the way of permanent improvement can be effected, or even -

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projected, until that is done. The fact is that the Officers of the Public works Department and of the Irrigational Depart-ment are themselves very fully occupied with their own duties, especially since their establishments have been cut-down. A large town, like Belfaum, can well afford to pay special agency for these purposes, and I am now arranging that it shall do so. The concern ought to have been already in a position to explain the large balance to the credit of the Yellauma Municipality. The Belgaum Municipal Commissioners are still fretful about

about the House tax. They have some reason on their side in the ~~proximity~~ of the town of Shahapur (which belongs to a Native State) to which both trade and people would probably move, if Belgaum were much taxed. I do not at present see my way out of this difficulty. My strictures on the general system of municipal taxation in the Belgaum District & the substitution of House-tax for octroi have had the desired effect, however, in Yenkaumatti & Gokak, where there is now a House-tax.

21 The increase in the

[Paras 59 & 60]

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[Paras 59 & 60] 21 The increase in the

number of schools and the attendance is a very healthy sign, and the District Local Funds Committee have very rightly expended much of their balances on new School Houses. If there are any girls' schools, as I presume there must be, in the District, they are not mentioned by the Collector.

22 I am constrained to express my opinion that Mr. Waddington has not shown himself the strong man at the helm so much needed in Belgaum; his work, as evinced, in instance by this report, is performed in a slipshod and perfunctory manner

manner.

Mr. Fleet's Report.

23. Mr. Fleet has now been more than a year at Belgaum and in that time he has twice acted for short terms as Collector

24 I have been thoroughly satisfied with what I have seen of his work except in the matter (See para 8 of this letter) of the tardy disposal of lands standing in the name of deceased Ryots. His report shows him to be a painstaking official, thoroughly master of the details of his duties. His personal inspection was

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extensive, and being very searchingly made, was the more useful. He has judiciously increased the License-Tax-assessment in Bidi & Sampgaon & has properly reduced it in Parasgad, where it was originally pitched too high. Mr. Fleet and Mr. McCorkell also have paid a good deal of personal attention to Birth Registration, and both propose legislation to make it compulsory. This is a big question, but hardly I think ripe as yet for the introduction of so strong a measure. On the whole, — Mr. Fleet is a very useful Government servant and I trust he will, as he easily can if

if he chooses, extend personal influence which his prestige as a Sanscrit scholar cannot fail to give him, if he cultivates, as he should do, cordial relations with all natives, and especially, the influential native gentlemen in his charge. Mr. Fleet will understand this hint.

Mr. McCorkell's Report

25. Mr. McCorkell's work has been much better throughout the year. He has moved actively about his charge, and performed a goodly amount of personal

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The District Deputy Collector's Report.

26 Mr. Balkrishna Deorao having joined his appointment only in June last, his report which has been compiled from the notes left by his predecessor, Mr. Guerin, necessarily contains nothing of interest and is purely formal.

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28. The omission to do the second examination of Attur Taluka is clearly due to negligence on the part of Mr. Guerin, as pointed out by the Collector.

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I have the honor to be
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Your most obedt. Servt.
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Commissioner

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Alexander Pitt
Auditor General

N.B.

Rec'd: 2/8/80 1981B

No 2012 of 1880. 27

From,

G. Waddington Esquire

Acting Collector and District

Magistrate.

Belgaum

To,

A. T. Crawford Esquire

Commissioner S. D.

Sir, Belgaum 24th July 1880.

I have the honor to submit the Annual Report on the Administration of this District for the Revenue

	Area in square miles	Population according to census of 1872
Collectorate	4591	938750
Native States	.	.

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There are no Native States in the Collector's charge in this District.

2. The following Officers have been at my disposal during the year of Report, and the manner in which their services have been utilized is shown in Appendix A annexed to this Report.

1. 1st Assistant Collector.

1. Supernumerary Assistant Collector.

1. District Deputy Collector.

1. Huzur Deputy Collector.

1. Cantonment Magistrate.

There have been but very few changes in the personnel of my Assistants during the year Messrs Flint and McCorkell have been serving in the District throughout the whole year Mr. J. A Guerin District Deputy Collector, — was on duty from the beginning of the year till he proceeded on two years furlough on the 15th April 1880. Rao Bahadoor Bal-krishna Deoras, who was ap-pointed by Government to succeed

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The Administration Reports of

of the Officers in charge of Divisions are herewith forwarded, accompanied with my remarks on each.

II. General Condition and Resources.

4. Season and Rainfall.—The total rainfall registered at the Civil Hospital at Belgaum, the Head Quarters station of the District, during 1879-80, was 48 inches — 61 cents, while the average for the preceding five years is 51 inches — 74 cents, as shown in the marginal table.

Rain fall at Head Quarters	
Average of preceding 5 years	Current year
51.74.	48.61.

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Rainfall at Head Quarters

The rainfall in excess

each Taluka station, as calculated from the 1st April to the 31st March, and as compared with the previous year, is shown below—

No.	Talukas	Rainfall			
		1878-79		1879-80	
		inches	cents	inches	cents
1.	Sampgaum	29	1	35	73
2.	Bidi	64	24	70	99
3.	Chikodee	37	24	32	23
4.	Paragad	35	61	27	03½
5.	Gokak	30	68	21	
6.	Athni	30	74	20	87

The monsoon broke very early during the season under report and there was rain almost every day during the second fortnight of May and consequently sowing operations were commenced early.

&c

In June the rainfall was seasonable throughout the greater part of the District, and though it was deficient in July in some Talukas, the sowing of the early or Kharif crops was nearly completed. In August there was an excessive fall in Belgaum, Sampgaum, and Bidi, and the crops in these Talukas suffered to some extent; while in Parasgad and Gokak, and in parts of the Athni and Chikodi Talukas, the crops were threatened with damage by rats. But early and prompt measures were taken for the

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the destruction of these vermin and were successful. From the beginning of August up to the 15th October, 135,226 rats were killed and the amount of rewards paid on that account was Rs 1352-3-5. Also large numbers of rats were probably destroyed by cultivators and others who did not apply for any rewards. Though at one time the prospect was anything but favourable, yet it does not appear that the crops were ultimately damaged to any serious extent by this pest.

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On the whole the season was a favourable one. In the Belgaum and Sampgaum Taluka the out turn of the Kharif crop was 12 and 14 annas in the Rupee respectively, while in the Bidi Taluka where the rain was more capricious, the yield of the crops was short; viz:- Rice, 8 annas; Jowari, 11 as; and Bajri, 11 as; but the sugarcane proved to be a bumper crop. In Chikodee the outturn of rice was 12 annas, and that of Jowari and Bajri 14 annas each. In the Gokak and Athni Talukas the crops

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The rural population of the District from the village census taken in July 1879, was 779,776.

	July 1878	July 1877	1878-79. Births	1878-79. Deaths
This shows	792252	779776	16,470.	29609

a very large decrease as compared with the population according to the Imperial Census of 1872. The figures of that census were maintained tolerably closely up to July 1877, — when the total population according to the Annual village census was 928,052 That the decrease since then is to be attributed directly to the Famine, which commenced in that year, is shewn by the fact

fact that the population fell in 1877 to 858,329, and in 1878 to 792,252. During these years, in addition to a larger than usual decrease by death, large numbers of people left the District to obtain employment and subsistence elsewhere, and have either died away from their homes or have not yet found it convenient to return and have been entered as "dead" by the Village Accountants, where probably the entry of "absent" would have been more correct. I believe that the results of the Annual Village Census are fairly accurate

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of keeping them accurately. But I do not see how, though accuracy is to be obtained, while the omission to give information of births and deaths is made an offence punishable summarily. Stringent orders have been issued from my office to all village officers on the subject of the taking of the Annual Census in the present month, as the returns will have to be used in the Imperial Census of February next for checking the preliminary entries in the enumera-

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accurate and reliable so far as deaths are concerned, but that from want of information being given by the Parents, numbers of births occur without being entered in the Registers. Every opportunity has been taken by my Assist-ants and by myself of exa-mining these Registers at the same time with the other Village Records,— or testing them by questions to the Ryots whenever the latter were present for the exa-mination of Receipt books,— and of impressing upon the Village Officers the great importance

of

of keeping them accurately. But I do not see how, though accuracy is to be obtained, unless the omission to give information of births and deaths is made an offence punishable summarily. Stringent orders have been issued from my office to all village officers on the subject of the taking of the Annual Census in the present month, as the returns will have to be used in the Imperial Census of February next for checking the preliminary entries in the enumera-

tors. Subscribed.

6 Public Health. The figures in the margin show that there was an increase of only 476 in the number of patients attending the Charitable Dispensaries during the year. The gradual increase in the number of patients attending the Dispensaries shows that these institutions are gradually growing ~~in~~ more and more in popular favour. At present there are only four dispensaries in this district, viz at Belgaum, Gokak, Athni and Soundatti; a fifth

	1878-79	1879-80
Dispensaries	4	4
Inpatients	42	104
Outpatients	20056	20470

at

at Nipani has been under contemplation for the last four or five years and applications have been made to Government for a grant in aid towards its maintenance, but it has been found impracticable to give the assistance asked for. Plans and Estimates for the Dispensary building have long since been prepared; and, in the application made to you in the month of May last, it was stated that the Municipality had promised to bear half the cost of the building, that it was

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	1878-79	1879-80.
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Out patients	20,056	20,470.

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was proposed to provide the other half from Local Funds, — and that what was asked from Government was the annual grant in aid towards the maintenance of the institution. But under your instructions, the question of the Dispensary has been put aside for the present, until the question of the water supply of the Town of Napanee has been disposed of.

Cholera did not make its appearance at all; and, with the exception that fever was very much more prevalent than usual, especially

especially in the Sanitary annexation of Palitana the public health during the year under report was good

7. Vaccination.

The table given in the margin shows the progress made by the Vaccination Department during the year ending on the 31st March 1880, as compared with the previous year.

	1878-79	*1879-80.
Primary	13859	15706
Revaccination	192	328

*Note- The figures given here are taken from the monthly returns received from the Vaccination Department but they slightly differ from those given by the Sanitary Commissioner in his Report which shows- Primary vaccination — 15529 Revaccination 329.

It is satisfactory to observe that the number of primary vaccination has increased by 1847 over the number for the preceding year. There are eleven Local Funds vaccinators

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especially in the Sampagaum Taluka, the public health during the year under report was good

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Primary	13,859	1,706
Revaccination	192	328

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Primary	13,859	15,706
Revaccination	192	328

*Note – The figures given here are taken from the monthly returns received from the Vaccination Department, but they slightly differ from those given by the Deputy Commissioner in his Report which shows. Primary vaccination here [illegible]

It is satisfactory to observe that the number of primary vaccination has increased by 1847 on the number for the preceding year. [illegible]

vaccinators, and one municipal vaccinator, in this District. Besides these, the Hospital Assistants in charge of the dispensaries at Altini, Gokak, and Soundatti, vaccinate in those Towns. This makes in all 15 vaccinators. Taking the work of the whole of these together, each vaccinator would appear to have vaccinated on an average 1047 children, and revaccinated 22, against 924 and 13 respectively during the preceding year

8. Agricultural Stock

As will be seen from the marginal

marginal table, the number of

Years	Cattle	Horses and Ponies	Sheep and Goats	Carts
1878	320267	5030	186095	20223
1879	340926	5368	196268	19998
Increase Decrease	20659	338	10173	225

cattle, horses and sheep increased considerably during the year, while the ~~number of carts diminished~~ decreased. Fuller details of these figures will be found in Appendix B. The increase in the live stock appears to be the result of returning prosperity.

9. The price of labour has remained stationary during the year

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1879	340,926	5368	196,268	19,998
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9. The price of labour has remained stationary during the

year, and calls for no remark, except that, labourers being tolerably full throughout the District, no variation in the rates appears probable.

Year	Wages per diem						Cart per diem			Pack bullocks + ponies		
	Skilled			unskilled								
1878-79	.	8	.	.	3	.	.	12	.	.	8	.
1879-80	.	8	.	.	3	.	.	12	.	.	8	.

10. The Prices of Produce.

A few of the more general articles of consumption are given in the margin, but the whole will be found in Appendix C to this Report. It will be seen that all

Articles	Quantity per Rupee per standard seer			
	on 31st March 1879		on 31st March 1880	
	Seers	Tolas	Seers	Tolas
Wheat	5	23	9	33
Dall	6	12	11	51
Rice common	10	.	11	34
Jowari	9	41	18	.
Bajri	12	29	16	47

the

the articles were sold at a far cheaper rate on the 31st March 1880, than they were on the corresponding date in the previous year. And though it cannot be said that the prices of grain have as yet returned to their normal rates, nevertheless they are still falling, and the prospects of the current season inclining me to believe that they will steadily continue to do so.

11. Takavi Advances.

Years	Seed Cattle &c.	Permanent Improvement
1878-79	381	500
1879-80	.	100

A small sum of Rupees 100 only has been advanced during

year, and calls for no remark, except that, labourers being valuati-ful throughout the District, no variation in the rates appears probable.

Year	Wages per diem						Cart per diem			Pack bullocks + ponies		
	Skilled			unskilled								
1878-79	.	8	.	.	3	.	.	12	.	.	8	.
1879-80	.	8	.	.	3	.	.	12	.	.	8	.

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Years	Seed Cattle &c.	Permanent Improvement	
1878-79	381	500	A small sum of
1879 80	.	. .	Rupees 100 only has
			been advanced

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year, and calls for no remark, except that, labourers being plenti-ful throughout the District, no variation in the rates appears probable.

Year	Wages per diem Skilled	Wages per diem unskilled	Cart per diem	Pack bullocks + ponies
1878-79	8	3	12	8
1879-80	8	3	12	8

iv. The prices of Food

A few of the more general articles of consumption are given in the margin, but the whole will be found in App. Appendix C to this Report. It will be seen that all

Articles	Quantity per Rupee per standard seer on 31st March 1879 Seers	Ounces	on 31st March 1880 Seers	Ounces
Wheat	5	23	9	33
Dall	6	12	11	51
Rice common	10	.	11	34
Jowari	9	41	18	.
Bajri	12	29	16	4

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11 Takavi Advances.

Years	Seed Cattle &c	Permanent Improvement	A small sum of
1878-79	381	500	Rupees 100 only has
1879-80			been advanced

during the year under the Land-Improvement Act. As stated in the last report the rules for granting these advances are too rigid to meet the convenience of the ryots, and therefore they prefer borrowing money from Sowkars at even higher rates of interest than those at which the Government will advance them money. I have personally taken every opportunity of informing the ryots of the willingness of Government to grant advances but my representations appeared to create no interest. In the Paraagad Taluka, there